

Abstract

A method of making crystals includes suspending a porous preform made of a crystal raw material in a hermetically-sealed chamber, heating the porous preform to a selected treatment temperature that enables reaction between a fluorinating agent and oxide impurities in the porous preform and reacting the fluorinating agent with the oxide impurities at the selected treatment temperature for a selected time period, filling a crucible in the hermetically-sealed chamber with a melt formed from at least a portion of the porous preform, and progressively moving the melt through a temperature gradient zone defined inside the hermetically-sealed chamber. An apparatus for making crystals includes a hermetically-sealed muffle furnace made of a non-porous refractory material, at least one port for entry and exit of gaseous substance within the muffle furnace, at least two temperature-controlled zones defined inside the muffle furnace, a crystal growth crucible disposed inside the muffle furnace, an actuator operable to translate the crucible along a length of the muffle furnace, and means for suspending a preform inside the muffle furnace.